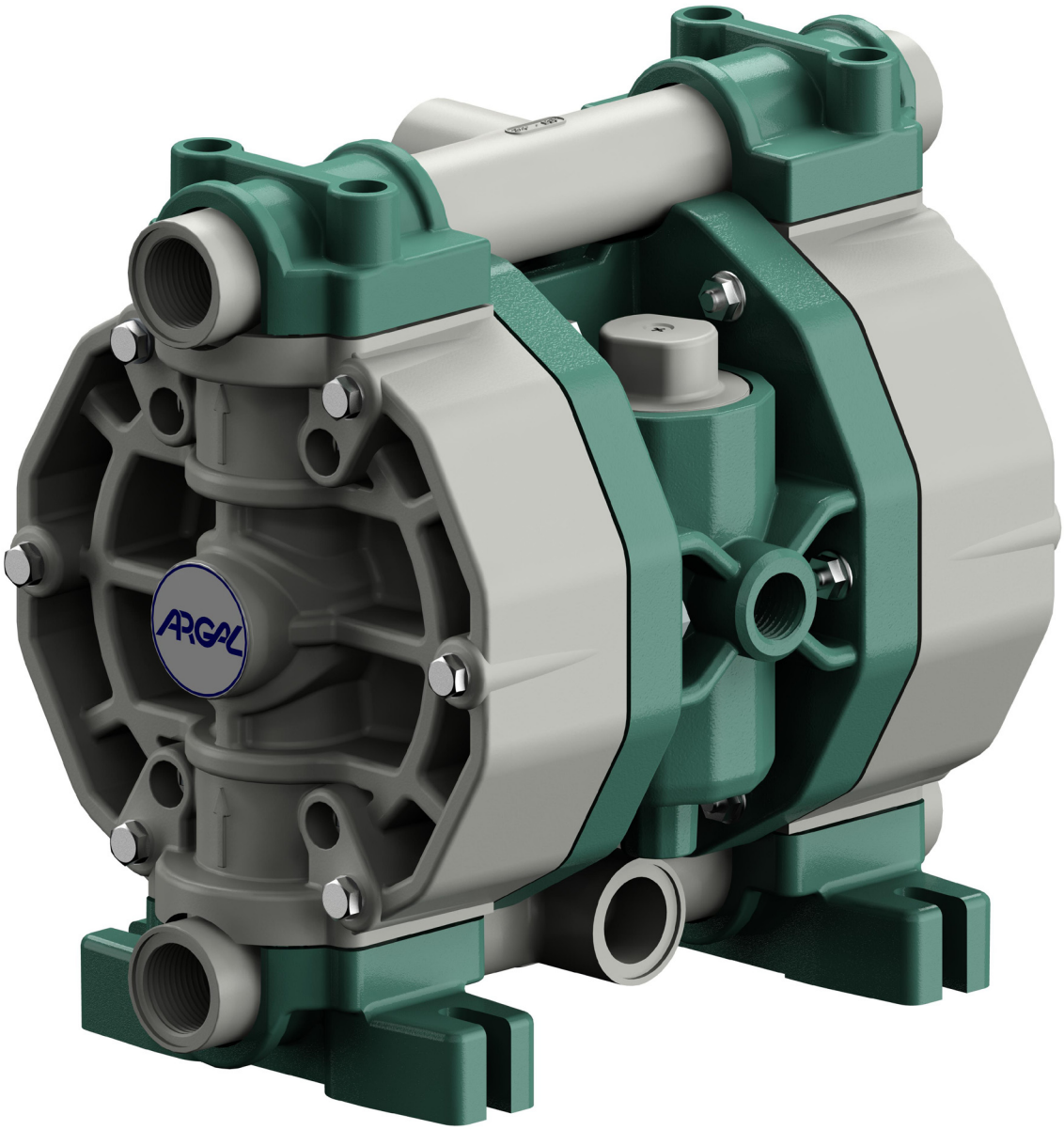
USER MANUAL

ASTRA



Part number _____

DEALER

for Maintenance
date of commissioning:
.....
position / system reference:
.....
service:
.....

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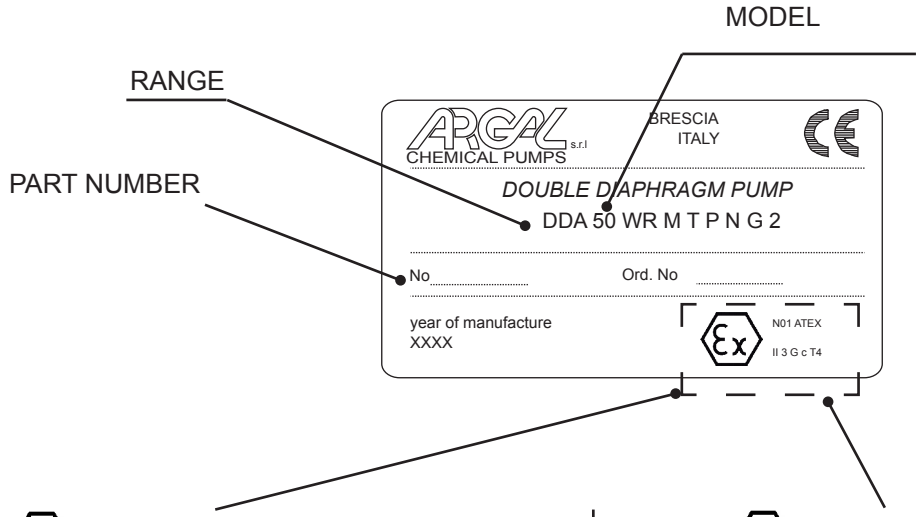
IDENTIFICATION CODE

range	model	materiali								connections			
		chambers		ATEX	diaphragm	valve		o-ring		type		scheme	
						ball	seats						
DDA	□ 25R (1/4")	□ WR	GFR-PP	□ X	□ H keyflex®	□ D EPDM	□ P PP	□ N (NBR)		□ G filetto BSP		□ 1	□ O
	□ 38R (3/8")	□ FC	CF+PVDF	□ X	□ M santoprene®	□ S AISI 316	□ K PVDF	□ V (FKM)		□ N filetto NPT		□ 2	□ V
	□ 50R (1/2")	□ DF	PVDF		□ D EPDM	□ N NBR	□ S AISI 316	□ D (EPDM)		□ I ISO-ANSI flange		□ 3	□ H
	□ 50C (1/2")	□ AL	aluminium	□ X	□ N NBR	□ T PTFE	□ A Al	□ T (PTFE)				□ 4	□ N
	□ 50 (1/2")	□ SS	AISI 316	□ X	□ U poliuretano		□ Z PE UHMW					□ 5	
	□ 75 (3/4")	□ SP	polished AISI 316	□ X	□ HT Keyflex® + PTFE							□ 6	
	□ 100C (1")				□ MT santoprene®+ PTFE							□ 7	
	□ 100 (1")											□ 8	
	□ 125 (1"1/4)											□ 9	
	□ 150 (1 1/2")											□ 10	
	□ 200 (2")												

Year of manufacture _____	Part number _____

Each pump is supplied with the serial and model abbreviation and the serial number on the rating plate, applied onto the support side. Check these data upon receiving the goods. Any discrepancy between the order and the delivery must be communicated immediately.

In order to be able to trace data and information, the abbreviation, model and serial number of the pump must be quoted in all correspondence.



II 2/2 GD c IIB T135°C

II 2/2GD: surface equipment for use in areas with the presence of gases, vapors or mists in addition to clouds of combustible dust in the air that occur occasionally during normal operation (EN 1127-1 par. 6.3), both in external and internal areas (ZONE 1).

c: protection by constructional safety (EN 13463-5).

IIB: excluding the following products hydrogen, acetylene, carbon disulphide.

T135°C: class of admitted temperatures. The processed fluid temperature value must fall within such class range and the user must comply with the instructions contained in the manual and with the current laws. Furthermore, the user must take into account the ignition point of the gases, vapors and mists in addition to clouds of combustible powder in the air existing in the area of use.

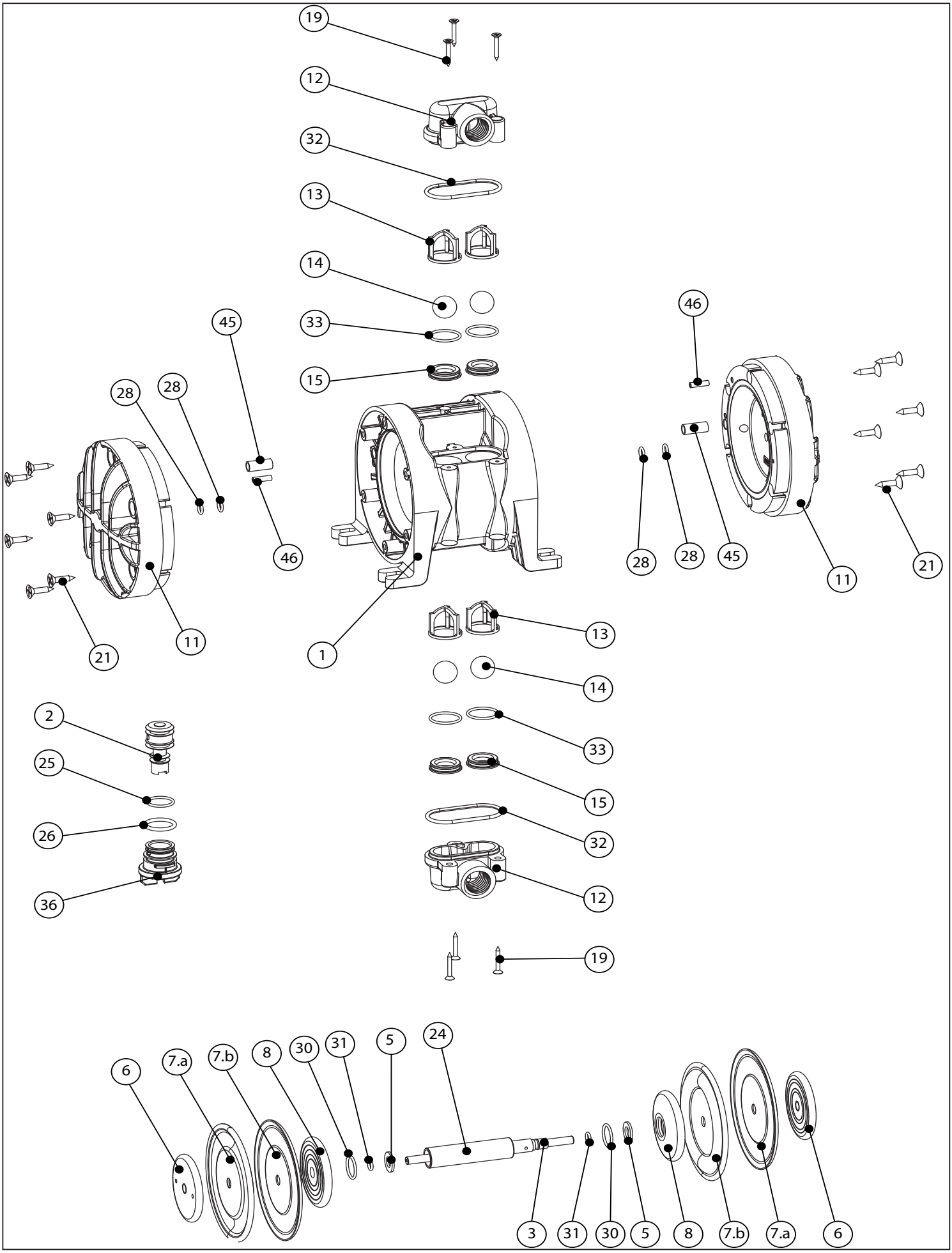
II 3/3 GD c IIB T135°C

II 3/3GD: surface equipment used in areas where the presence of gas, vapors or mists in addition to clouds of combustible powder in the air is unlikely during normal operation both in external and internal areas and, if it does occur, it will only persist for a short period (ZONE 2).

c: protection by constructional safety (EN 13463-5).

IIB: excluding the following products hydrogen, acetylene, carbon disulphide.

T135°C: class of admitted temperatures. The processed fluid temperature value must fall within such class range and the user must comply with the instructions contained in the manual and with the current laws. Furthermore, the user must take into account the ignition point of the gases, vapors and mists in addition to clouds of combustible powder in the air existing in the area of use.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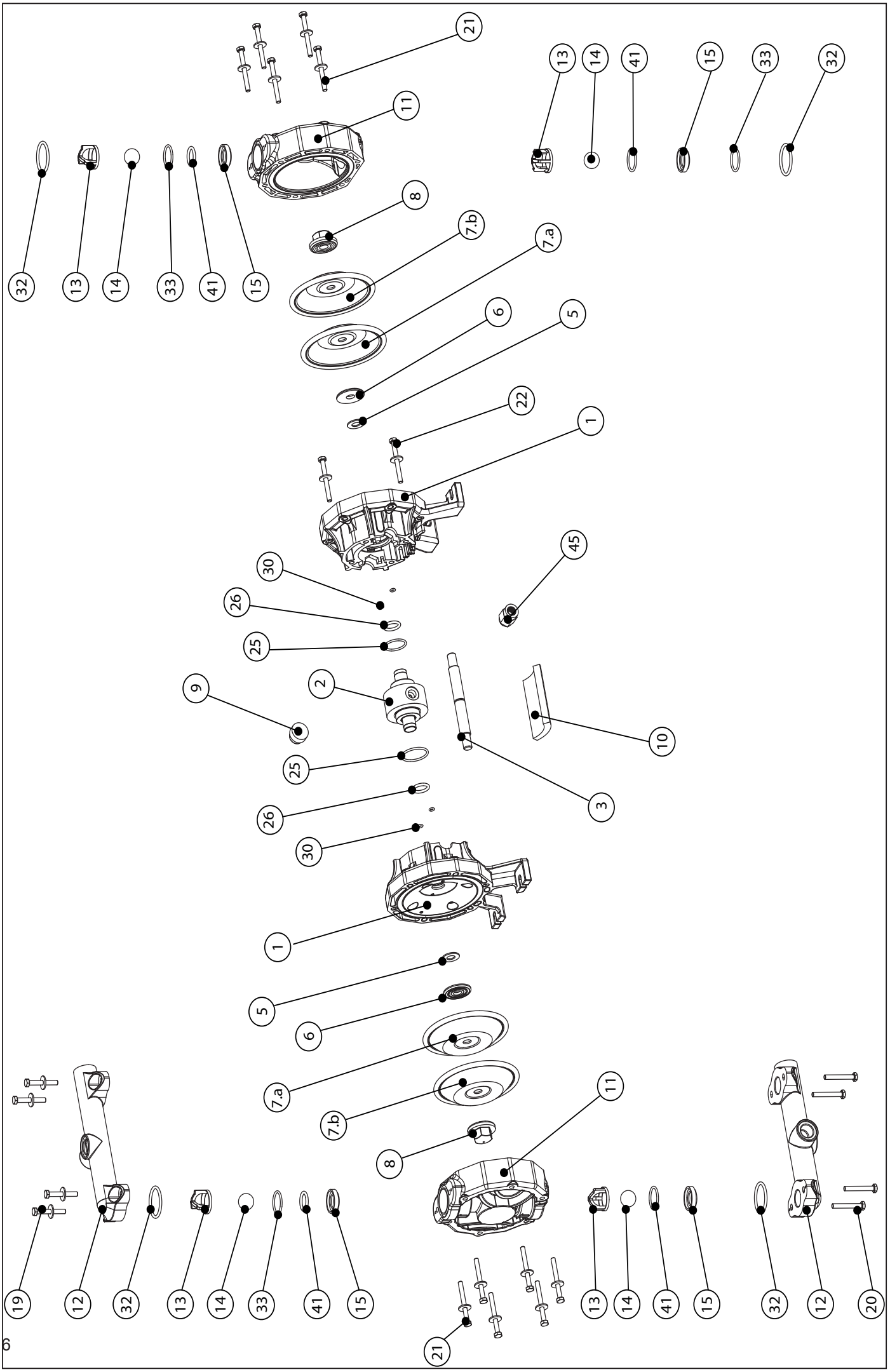
7.b
7.a
6

LEGEND 14C - 38C - 50C

note	ref.	pos.	Description	Q.ty	Disassembling steps sequence												Spare stock for working years	
					1	2	3	4	5	6	7	8	9	10	11	12	2	5
	491	1	Central casing	1														
	677	2	spool	1		●												
	210	3	Shaft	1									●					
	950	5	washer	2						●								
	488	6	Cap (air side)	2			●											
	418.1	7.a	Diaphragm	2				●										
	418.2	7.b	PTFE Diaphragm	2				●										
	260	8	Cap (fluid side)	2					●									
	102	11	casing (air side)	2		●												
	705	12	manifold	2		●												
	751	13	Ball runner cage	4				●										
	753	14	Ball	4				●										
	752	15	Ball seat	4				●										
	910.1	19	Manifold connection: central casing / manifold	2	●													
	910.5	21	Connection: central casing / casing (air side)	2	●													
	524	24	sleeve bushing	1								●						
	412.1	25	O-ring	1		●												
	412.2	26	O-ring	1		●												
	412.4	28	O-ring	4			●											
	412.6	30	O-ring	2						●								
	412.7	31	O-ring	2							●							
	412.8	32	O-ring	2			●											
	412.9	33	O-ring	4				●										
	912	36	Pneumatic exchanger cap	1	●													
		45	connection air casing	2			●											
		46	connection control signals	2			●											


21
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41
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7.b
7.a
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25
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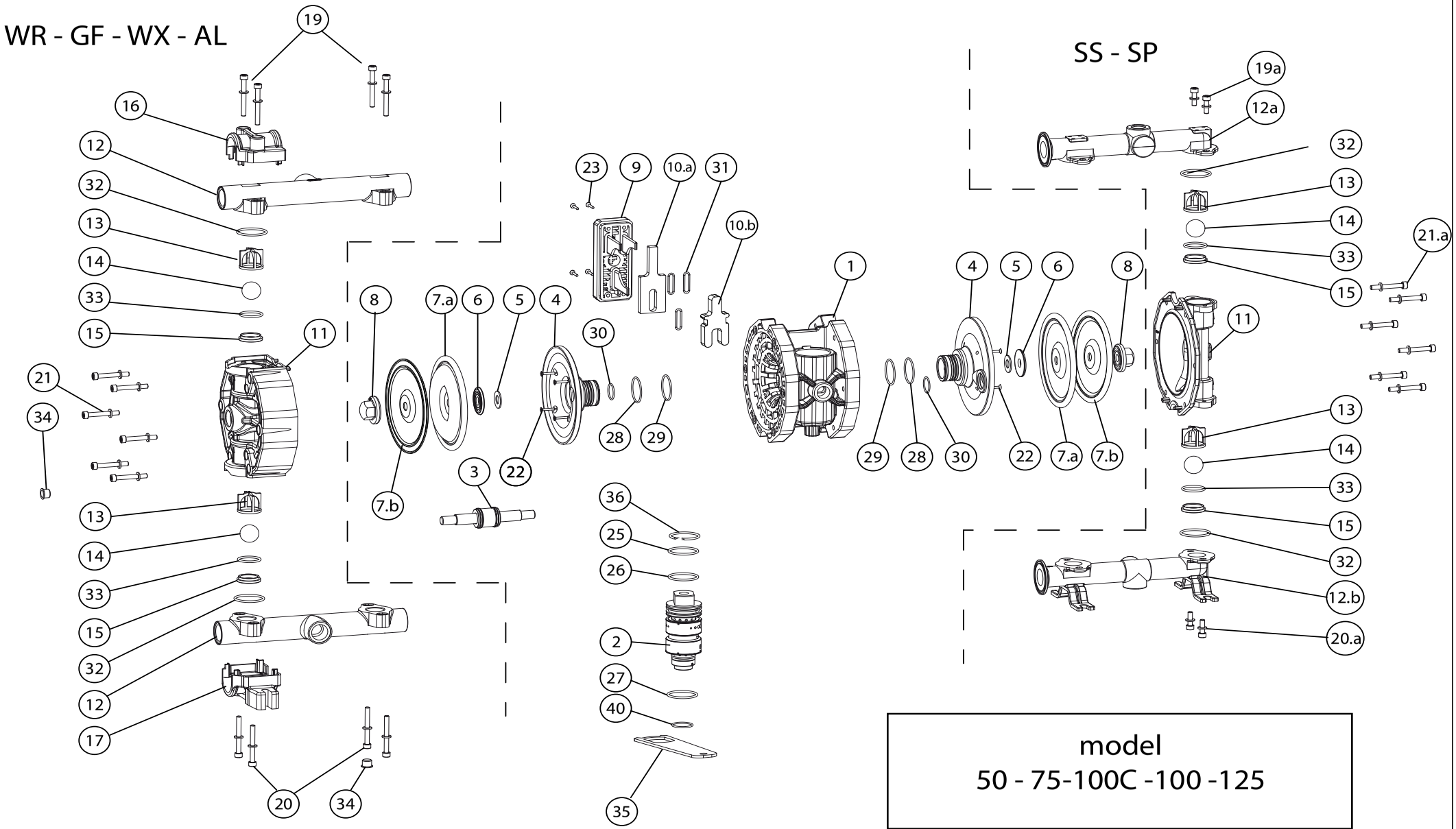
2
10
3
1
5
6
7.a
7.b
8
11
19
12
20

LEGEND 50C

note	ref.	pos.	Description	Q.ty	Disassembling steps sequence												Spare stock for working years	
					1	2	3	4	5	6	7	8	9	10	11	12	2	5
	491	1	semi-central casing	2														
	677	2	Pneumatic exchanger	1								●						
	210	3	Shaft	1								●						
	950	5	Belleville washer	2							●							
	488	6	Cap (air side)	2							●							
	418.1	7.a	Diaphragm	2							●							
	418.2	7.b	PTFE Diaphragm	2							●							
	260	8	Cap (fluid side)	2						●								
	160	9	Exhaust cover	1								●						
	675.1	10	Silencier	1								●						
	102	11	Pump Casing	2					●									
	705	12	Manifold	2		●												
	751	13	Ball runner cage	4			●											
	753	14	Ball	4			●											
	752	15	Ball seat	4			●											
	910.1	19	Manifold connection (outlet side)/ pump casing	1	●													
	910.3	20	Manifold connection (inlet side) / pump casing	1	●													
	910.5	21	Connection: central casing /pump casing	1				●										
	910.7	22	Connection central casing	1								●						
	412.1	25	O-ring	2									●					
	412.2	26	O-ring	2									●					
	412.6	30	O-ring	4									●					
	412.8	32	O-ring	4			●											
	412.9	33	O-ring	4			●											
	412.12	41	O-ring	4			●											
		45	connection air	1								●						


WR - GF - WX - AL
SS - SP
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7.a
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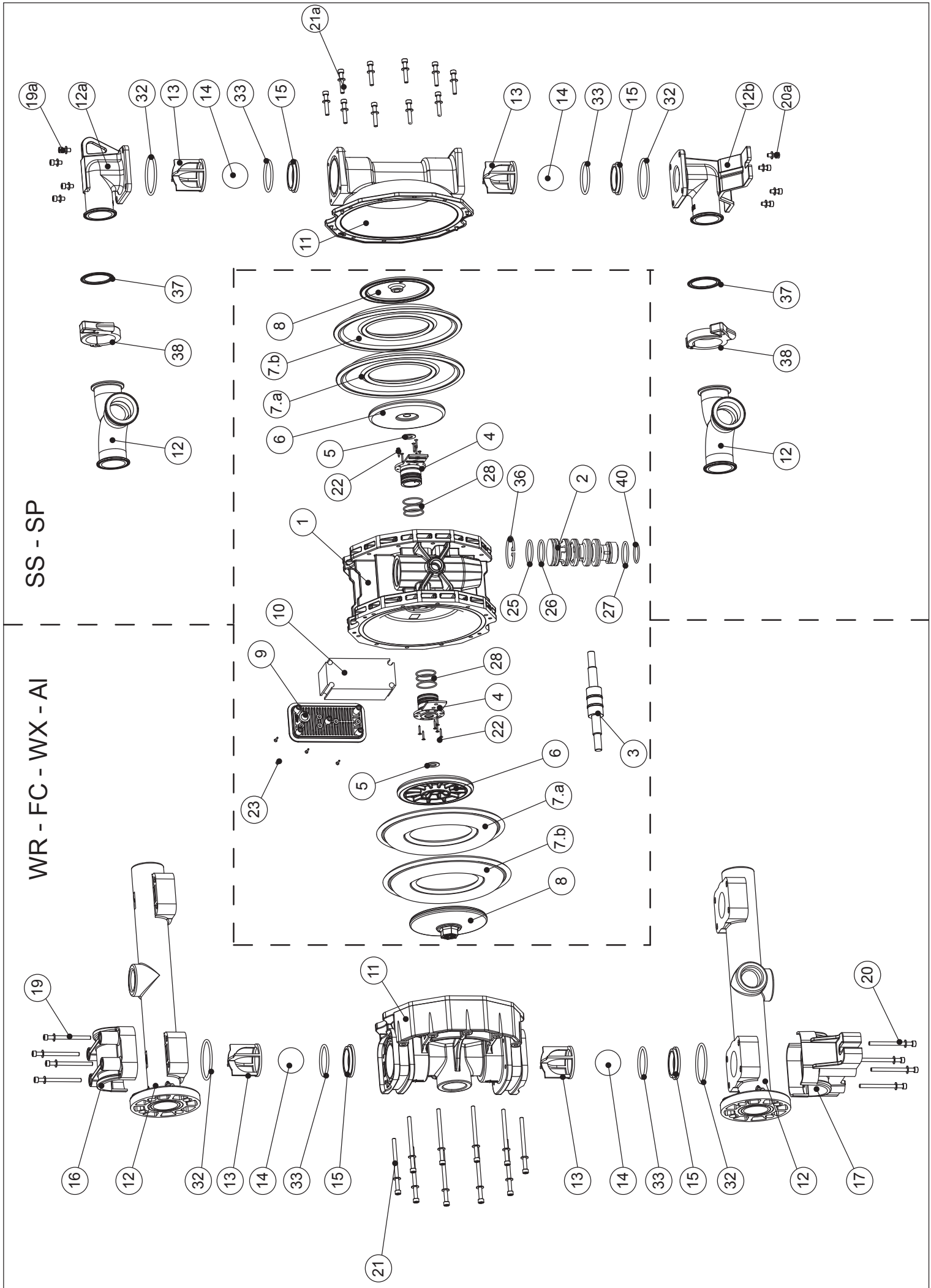
7.b
23
9
10.a
31
10.b
1
36
25
26
2
27
40
35
19a
12a
21.a
12.b
20.a
model
50 - 75-100C -100 -125

LEGEND 50 - 75 - 100C - 100 - 125

note	ref.	pos.	Description	Q.ty	Disassembling steps sequence												Spare stock for working years	
					1	2	3	4	5	6	7	8	9	10	11	12	2	5
	491	1	Casing	1														
	677	2	Pneumatic exchanger	1			●											
	210	3	Shaft	1												●		
	134	4	intermediate plate	2											●			
	950	5	Belleville washer	2									●					
	488	6	Cap (air side)	2									●					
	418.a	7.a	Diaphragm	2									●					
	418.b	7.b	PTFE Diaphragm	2									●					
	260	8	Cap (fluid side)	2								●						
	160	9	Exhaust cover	1		●												
	675.1	10.a	Silencier external	1			●											
	675.2	10.b	Silencier internal	1			●											
	102	11	Pump Casing	2							●							
	705	12	Manifold	2			●											
	705.1	12.A	Manifold (vers. SS -SP)	1		●												
	705.2	12.B	Manifold (vers. SS -SP)	1		●												
	751	13	Ball runner cage	4					●									
	753	14	Ball	4					●									
	752	15	Ball seat	4					●									
	193	16	Manifold lock cover	2		●												
	182	17	Foot	2		●												
	910.1	19	Manifold connection: discharge / coaxial chamber	1	●													
	910.2	19.A	Manifold connection: discharge / coaxial chamber (vers. SS - SP)	1	●													
	910.3	20	Connection: foot / coaxial chamber	1	●													
	910.4	20.A	Connection: foot / coaxial chamber (vers. SS - SP)	1	●													
	910.5	21	Connection: coaxial chamber / casing	2						●								
	910.6	21.A	Connection: coaxial chamber / casing (vers. SS - SP)	2						●								
	910.7	22	Connection: diaphragm / casing	2										●				
	910.8	23	Connection: silencier cover / casing	1	●													
	412.1	25	O-ring	1			●											
	412.2	26	O-ring	1			●											
	412.3	27	O-ring	1			●											
	412.4	28	O-ring	2												●		
	412.5	29	O-ring	2												●		
	412.6	30	O-ring	2												●		
	412.7	31	O-ring	3				●										
	412.8	32	O-ring	4				●										
	412.9	33	O-ring	4					●									
	939	34	Caps kit (submerged model)	1														
	070	35	Chiave di regolazione	1														
	932	36	seeger ring	1	●													
	412.11	40	O-ring	1			●											


SS - SP
WR - FC - WX - AI
19a
12a
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12b
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7.b
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LEGEND 150 - 200

note	ref.	pos.	Description	Q.ty	Disassembling steps sequence											Spare stock for working years	
					1	2	3	4	5	6	7	8	9	10	11	12	2	5
	491	1	Casing	1														
	677	2	Pneumatic exchanger	1			●											
	210	3	Shaft	1												●		
	135	4	Intermediate plate	2											●			
	950	5	Belleville washer	2									●					
	488	6	Cap (air side)	2									●					
	418.1	7.a	Diaphragm	2									●					
	418.2	7.b	PTFE Diaphragm	2								●						
	260	8	Cap (fluid side)	2								●						
	160	9	Exhaust cover	1		●												
	675	10	Silencier	1			●											
	102	11	Pump Casing	2							●							
	705	12	Manifold	2			●											
	705.1	12.A	Elbow manifold (up side) (vers. SS -SP)	1		●												
	705.2	12.B	Elbow manifold (down side) (vers. SS -SP)	1		●												
	751	13	Ball runner cage	4					●									
	753	14	Ball	4					●									
	752	15	Ball seat	4					●									
	193	16	Manifold lock cover	2		●												
	182	17	Foot	2		●												
	910.1	19	Manifold connection: discharge / coaxial chamber	1	●													
	910.2	19.a	Manifold connection: discharge / coaxial chamber (vers. SS - SP)	1	●													
	910.3	20	Connection: foot / coaxial chamber	1	●													
	910.4	20.a	Connection: foot / coaxial chamber (vers. SS - SP)	1	●													
	910.5	21	Connection: coaxial chamber / casing	2						●								
	910.6	21.a	Connection: coaxial chamber / casing (vers. SS - SP)	2						●								
	910.7	22	Connection: diaphragm / casing	2										●				
	910.8	23	Connection: silencier cover / casing	1	●													
	412.1	25	O-ring	1			●											
	412.2	26	O-ring	1			●											
	412.3	27	O-ring	1				●										
	412.4	28	O-ring	6												●		
	412.8	32	O-ring	4				●										
	412.9	33	O-ring	4					●									
	932	36	seeger ring	1	●													
	412.10	37	Clamp gasket	4		●												
		38	Clamp	4	●													
	412.11	40	O-ring	1			●											

GENERAL NOTES

“ASTRA” series pumps are air-operated, double-diaphragm positive-displacement pumps, designed and manufactured for pumping fluids that are chemically compatible with the constructive materials of the pump. The characteristics of the fluid (pressure, temperature, chemical reactivity, specific weight, viscosity, vapour pressure) and of the environment must be compatible with the pump characteristics and are defined in the ordering phase.

The pump performances (flow rate, head, and minimum pressure) are decided in the ordering phase and indicated on the nameplate.

“ASTRA” series pumps are self-priming; at the start-up the pipes can be empty.
The declared dry negative suction is referred to intake of water at a temperature of 20°C/ 68°F.
The priming time and the diaphragm’s life depend on.

- the suction circuit (total length and diameter)
- specific weight of the pumped fluid
- viscosity of the pumped fluid
- negative suction: max 5.000 cps (at 18°C / 64,4°F)
- below head suction: max 50.000 cps (at 18°C / 64,4°F)

“ASTRA” series pumps may be used dry

“ASTRA” series pumps cannot be used to generate a vacuum

Make sure that the physical-chemical characteristics of the fluid have been correctly evaluated.

The maximum temperature referred to water in continuous operation depends on the version of the materials (indicated on the nameplate) and on the environment in which the pump will be installed:

version	MAX Temperature (°C / °F) Zone 1 (atex)	MAX Temperature (°C / °F) Zone 2 (atex)
WR	60°C / 140°F	60°C /140°F
FC	80°C / 176°F	90°C / 194°F
DF	NA	90°C / 194°F
SS	80°C / 176°F	95°C / 203°F
AL	80°C / 176°F	95°C / 203°F
SP	80°C / 176°F	95°C / 203°F

The ambient temperature interval is related to the choice of materials (specified on the identification plate):

Version	MAX ΔT (°C / °F)
WR	0÷40°C / 14÷104°F
FC	0÷40°C / 14÷104°F
DF	0÷40°C / 14÷104°F
SS	0÷40°C / 14÷104°F
AL	0÷40°C / 14÷104°F
SP	0÷40°C / 14÷104°F

The pump may be operated at a maximum pressure equal to 1.5 times the head value with closed delivery.

The value of the vapour pressure of the pumped fluid must be greater (of at least 3 mwc - meters of water column) than the difference between the total absolute head value (pressure on suction level subtracted of the suction height) and the leakages of the suction section.

“ASTRA” series pumps (except for models 25R – 38R – 50R - 50C) are equipped with flow regulator on the pneumatic supply circuit.

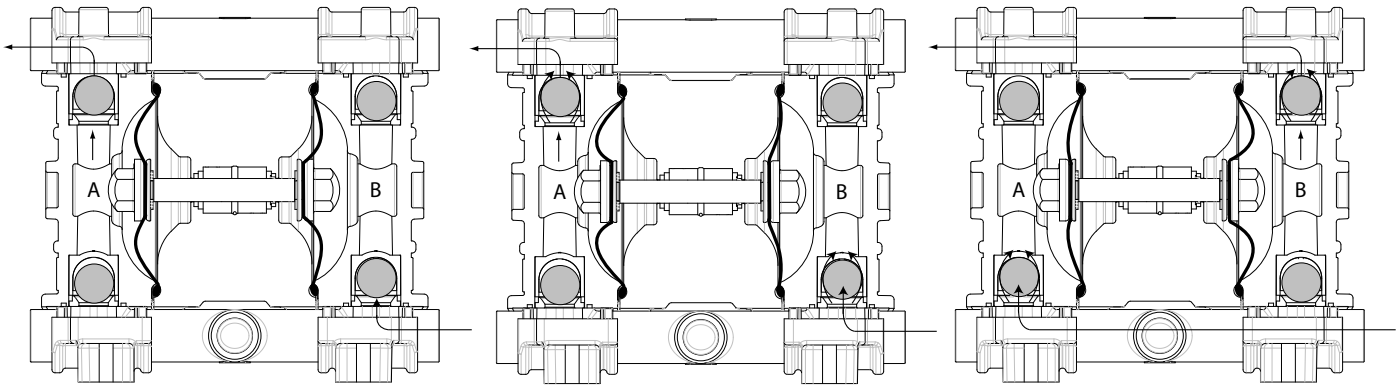
The pumped fluid may contain particles suspended in different concentrations in accordance with the type of valve assembled:

Model	25R – 38R – 50R	50C	50 – 75 - 100C	100 – 125	150 – 200
max. dimension (mm)	3	3	6	7,5	8,5

OPERATING PRINCIPLE

The pneumatic distribution system sends compressed air behind one of the two diaphragms (A), which pushes the fluid towards the delivery circuit.
Simultaneously, the opposite diaphragm (B) is in the intake phase since it is dragged by the shaft that connects it to the other diaphragm (A) under pressure; air present behind it is discharged into the environment through the flow rate regulator present on the pump (except for models 25R – 38R – 50R), while a pressure drop is created in the fluid chamber which sucks the fluid from the suction circuit.
When the diaphragm (A), under pressure, reaches the stroke limit, the distributor switches the two inputs to the chamber on the diaphragms air side, putting diaphragm (B) under pressure and diaphragm(A) in discharge.

When the pump reaches its original starting point, each diaphragm has carried out one air discharge stroke and one fluid delivery stroke. This sequence of movements makes up a complete pumping cycle.



PNEUMATIC CONNECTION

WARNING: the pneumatic supply of “ASTRA” series pumps must be carried out with oil-free, filtered, dry and unlubricated air
Avoid pressure drops by using pipes and adjusting and controlling elements having characteristics suitable for the pump
In case of installation in atex zone, the compressor must suck air from outside the area classified as atex or use inert gas

Minimum pressure supply 2 bar
Maximum pressure supply 7 bar

STANDARD

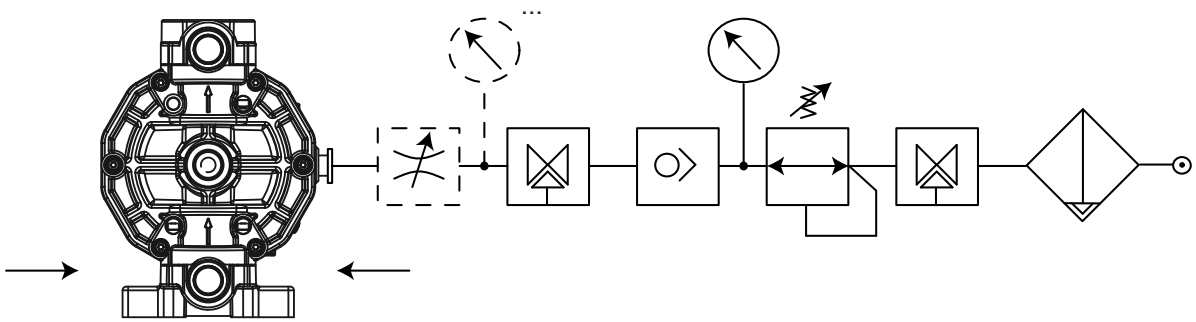
1 – pressure regulator with gauge
2 - shut-off valve
3 – way valve
4 – flow regulator

Compressed air supply pipes - nominal dimensions:

model	Ø air pipe
14R – 38R – 50R	Ø6
50C	Ø6
50 – 75 - 100C	Ø8
100 - 125	Ø10
150 - 200	Ø12

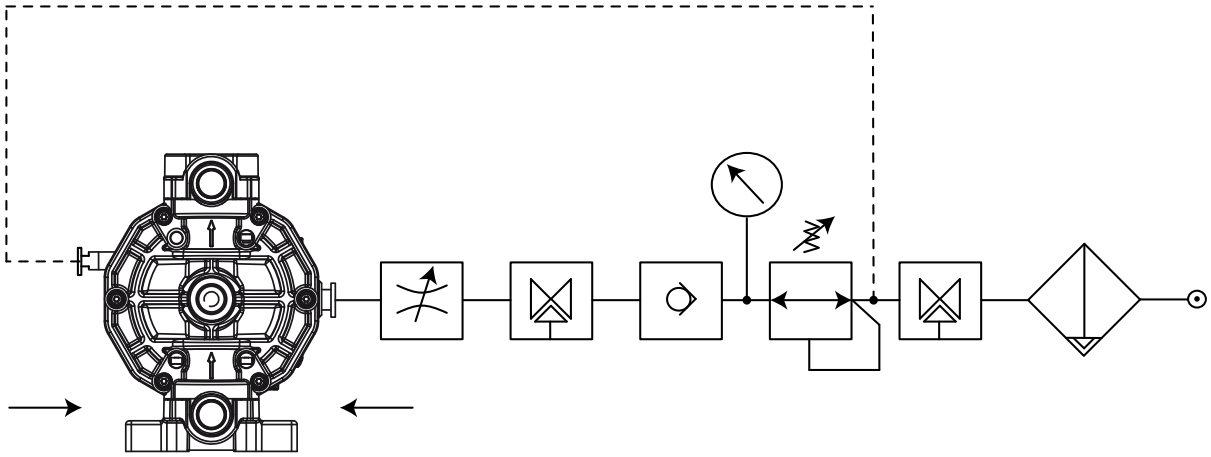
maximum length between tube and pump plant: 5m

:



FINE ADJUSTMENT / DOSING /... (except for models 25R – 38R – 50R - 50C)

It is possible to supply the pneumatic control circuit and the pneumatic power circuit with two separate air lines, in order to allow fine adjustment of the pump working cycle



INSTALLATION AND USE INSTRUCTIONS

TRANSPORT

- cover the hydraulic connections
- lift the hydraulic plastic parts without mechanical stress
- for transport on irregular roads, cushion the bumps with suitable support plane
- blows and impacts may damage parts that are important for the machine operation and safety

USE

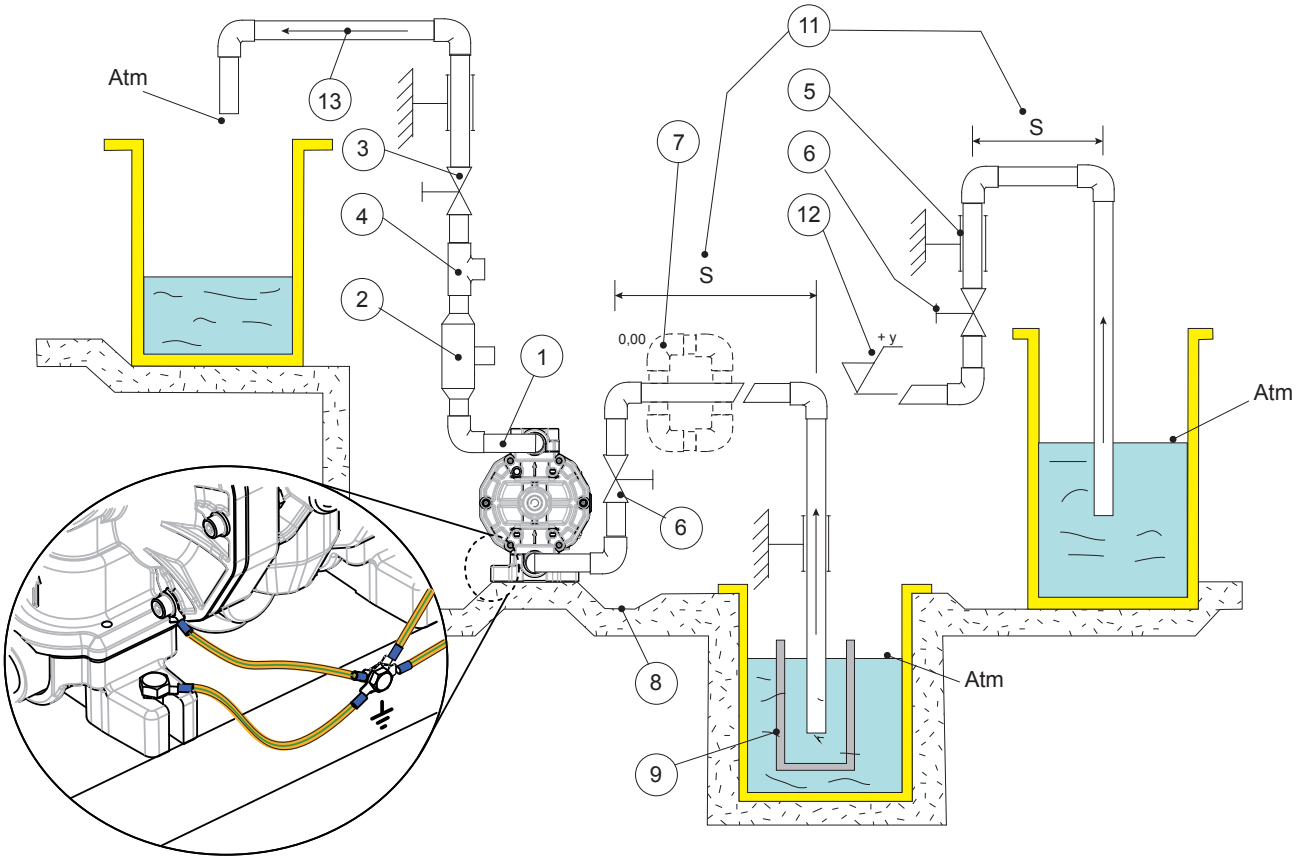
- do not operate valves or shunts during the pump operation
- risk of harmful water hammers in case of incorrect or sudden operations (valves must be operated only by trained personnel)
- empty and wash accurately inside the pump in case different fluids must be pumped
- insulate or empty the pump if the fluid crystallization temperature is equal to or below the ambient temperature
- stop the pump if the fluid temperature exceeds the maximum allowed temperature indicated in the GENERAL NOTES; if the exceeding temperature is about 20% it is necessary to inspect the status of the internal parts
- stop the pump and close the valves in case of leaks
- wash with water only if chemical compatibility allows it ; alternatively use the suitable solvent that does not generate hazardous exothermic reactions
- consult the fluid supplier to decide the most suitable fire-prevention method
- empty the pump in case of long periods of disuse (particularly with fluids which are particularly tending to crystallize)
- check that there is no gas in the delivering fluid, if there is stop the pump

INSTALLATION

- it is essential for the pump self-priming operation that the hydraulic system is leakproof
- clean the system before connecting the pump
- the pump must not contain foreign bodies and all the seals on the hydraulic connections must be removed
- check the correct tightness of all the screws on the pump
- the pump positioning is horizontal, the fluid delivery manifold must always be positioned in the upper part (see arrows on the pump casing)
- fastening may be on the floor or on the ceiling
- position the pump the closest possible to the point of collection

use the plant solutions indicated in the following diagram:

1. YES: use flexible pipes reinforced with rigid spiral to connect the hydraulic circuit of the pump. Rigid piping may cause strong vibrations and manifolds breaking. Do not use pipes with nominal diameter smaller than the diameter of the pump connections. For negative installations and/or viscous fluids use pipes with greater diameter related to the nominal diameter of the pump
2. YES: pulse damper
3. YES: gate valve for delivery adjustment
4. YES: intake for gauge or protection pressure switch
5. YES: pipe anchoring
6. YES: shut-off valve
7. NO: air pockets; the circuit must be linear and short
8. YES: discharge duct around the base
9. YES: wide and rigid filtering separator in case of open tanks
10. YES: wide and rigid filtering separator in case of open tanks



- ensure drainage of fluids which may come out of the pump
- fix the pump using all the available locking holes, the support points must be levelled
- arrange for enough room around the pump for the movements of an operator
- arrange for free space above the pump for lifting it
- inform about the presence of aggressive fluid with suitable coloured labels in accordance with the related standard
- do not install the pump (built with thermoplastic material) near heat sources
- do not install the pump in places with risk of fall of solids or fluids
- do not install the pump close to fixed workplaces or visited areas
- install additional protection shield, for the pump or for the persons as appropriate. If the diaphragm breaks the fluid may enter into the pneumatic circuit and come out from the pump discharge port
- install a spare equivalent pump connected in parallel
- the pump must be always electrically earthed
- if the pump is made from conductive materials and is suitable for flammable products, each pump casing must be equipped with a suitable earthing cable: DANGER OF EXPLOSION AND/OR FIRE
- WARNING The pumps must always be grounded irrespective of any organ to which it is connected. Lack of grounding or incorrect grounding will cancel the requirements for safety and protection against the risk of explosion

START UP

- check the correct execution of what indicated in the INSTALLATION paragraph
- check that the intake and delivery pipes of the hydraulic circuit are correctly connected
- open the intake and delivery valves of the pump hydraulic circuit
- open the 3-way valve on the air circuit
- set the operation point requested for the pump: properly adjust the air pressure and delivery that supplies the pump. With pressure values under 2 bar the pump may stall, with pressure values above 7 bar it is possible that breakdowns and/or yields may occur with consequent spillage of the pumped fluid
- for pumps with split manifold the two pumped fluids must have the same viscosity value, very different viscosity values may lead to stall problems and/or diaphragms breaking
- do not operate at the limits of the operation curves: the maximum head or maximum delivery (total absence of leaks and intake height in the delivery circuit)
- check that there are no anomalous vibrations or noise due to the too elastic support structure, unsuitable fastening or cavitation
- after 2 hours of operation stop the pump correctly and check the tightening of all the bolts on the pump

USE

- do not operate valves or shunts during the pump operation
- risk of harmful water hammers in case of incorrect or sudden operations (valves must be operated only by trained personnel)
- empty and wash accurately inside the pump in case different fluids must be pumped
- insulate or empty the pump if the fluid crystallization temperature is equal to or below the ambient temperature
- stop the pump if the fluid temperature exceeds the maximum allowed temperature indicated in the GENERAL NOTES; if the exceeding temperature is about 20% it is necessary to inspect the status of the internal parts
- stop the pump and close the valves in case of leaks
- wash with water only if chemical compatibility allows it ; alternatively use the suitable solvent that does not generate hazardous exothermic reactions
- consult the fluid supplier to decide the most suitable fire-prevention method
- empty the pump in case of long periods of disuse (particularly with fluids which are particularly tending to crystallize)
- check that there is no gas in the delivering fluid, if there is stop the pump

STOP

To stop the pump, operate exclusively on the air supply closing the 3-way valve, discharging in this way residual pressure from the pneumatic system of the pump.

WARNING never stop the pump by totally closing the suction and/or delivery valves of the hydraulic circuit

MAINTENANCE

- all the operation must be carried out by qualified personnel
- do not carryout maintenance and/or repairs with the air circuit under pressure
- carry out periodic inspections (2 ÷ 30 days in accordance with the fluid pumped) to check the filtering elements cleaning
- carry out periodic inspections (3 ÷ 5 months in accordance with the fluid pumped and with the environment conditions) to ensure the correct operation of the system start/stop units
- the presence of fluid under the pump casing may indicate failures to the pump
- damaged parts must be replaced with complete original parts and not with repaired parts
- the replacement of damaged parts must be carried out in a clean and dry place

RECOMMENDATIONS

WARNING: before performing any maintenance or repair work on the pump, disconnect the pump from the air supply line. Disconnect the hydraulic connections and discharge the product that is being pumped

- all the operation must be carried out by qualified personnel
- use gloves, goggles and acid-resistant clothing when disconnecting from the system and washing the pump
- wash the pump before carrying out maintenance operations
- do not disperse the washing waste into the environment

DISASSEMBLY

- Bolts are the type with right thread
- Clean all the pump external surfaces using a damp cloth

Ball seats removal (for all models)
- Remove the delivery and intake manifolds removing the tightening bolts
- Pull off the seats, the balls and the related cages
- Check the condition of the gasket

Diaphragms removal
DDA 25R-38R-50R
- Remove the two casings (air side)
- Remove the plates that lock the diaphragms
- Remove the diaphragms and the related backing plates
DDA 50C-50-75-100C-100-125-150-200
- Remove the delivery and intake manifolds removing the tightening bolts
- Remove the deposits from the internal surfaces
- Remove the two pump casings
- Remove the plates that lock the diaphragms
- Remove the diaphragms and the related backing plates
- If it would be necessary to disassemble the shaft, remove one of the two diaphragms on air side and then pull off the shaft

Pneumatic distributor removal
DDA 25R-38R-50R
- turn about 90° clockwise (or anticlockwise) the pneumatic exchanger cap (pos 36)
- slip off the pneumatic exchanger cap and the spool (if necessary use a M6 screw for slip off the spool)
DDA 50C
- remove the manifolds, pump casing and diaphragms
- remove the bolts (pos.22) and divide the semi-central casing
DDA 50C-50-75-100C-100-125-150-200
- Remove the seeger ring of the transverse sleeve of the central casing
- Overturn the pump and with the aid of a Ø6 mm punch and a press, pull off the distributor (this operation may be carried out with pump casings assembled, check that the tightening bolts of the pump casings located on the upper area of the distributor to not obstacle the distributor removal)
- WARNING the pneumatic distributor shall not be opened to prevent an incorrect reassembling that may cause the pump malfunctioning

INSPECTION

Check the absence of:

· excessive abrasion of the thermoplastic parts
· clots and/or agglomerates due to the pumped fluid
· deformations and/or surface lesions of the diaphragms
· deformations and/or breakages on the valve seats

Replace the parts: broken, cracked, deformed.
Reopen all the clogged ducts and eliminate any chemical agglomerates.
Clean all the surfaces before reassembly, particularly the OR gaskets seats (risk of leaks for dripping).

CLEANING AND REPLACING THE DIAPHRAGMS

control and internal cleaning every 500.000 cycles
diaphragm check every 5.000.000 cycles
diaphragm replacement every 20.000.000 cyclesi

SAFETY RULES

WARNING! CHEMICAL RISK. Pumps are intended for operation with different types of fluids and chemical solutions. Follow the specific internal instructions for decontamination during the inspection or maintenance operations.

WARNING! ELECTRICAL RISK. The pump must always be earthed independently to other members connected to it. Safety requirements and explosion risk prevention are not fulfilled if the pump is not earthed or is incorrectly earthed.

WARNING: the diaphragms (into contact with the product and external) are components extremely subject to wear. Their duration is strongly affected by the conditions of employments and by chemical and physical stresses. By tests carried out on thousands of pumps installed with head value from 0° to 18°C, the ordinary life exceeds one hundred million cycles. For safety reasons, in environments with explosion risk it is necessary to disassemble and check the diaphragms every five million cycles and to replace them every twenty million cycles.

WARNING! In the case of diaphragms total breaking, the fluid may enter in the pneumatic circuit, damage it and come out from the discharge port. Therefore it is necessary to convey the air discharge in a piping up to a safe area.

WARNING! In situations where the user foresees the possibility of exceeding the temperature limits indicated in this manual, it is necessary to install a protection device on the equipment that prevents to achieve the maximum operating temperature allowed. If exceeded, respect to the maximum marking temperature is not guaranteed.

REMEMBER! Safety risks to persons are mainly caused by improper use or accidental damage. These risks may be of hand injury for operators working on the open pump, or caused by the nature of the fluids that are conveyed by this type of pump. Therefore it is extremely important to diligently carry out all the instructions contained in this manual in order to eliminate the causes of accidents that may lead to the pump failure and to the subsequent outcome of fluid hazardous to persons and to the environment.

For installation and use in a potentially explosive environment, comply with these general precautions:

- ascertain that the pump is full and if possible, that the level is above it by 0.5 m
- ascertain that the fluid treated does not contain or cannot contain large solids or solids of a dangerous shape
- ensure thet the intake or delivery ports are not obstructed nor limited to avoid cavitation or pneumatic motor strain;
- also ascertain that the connection piping is strong enough and cannot be deformed by the pump weight or by the intake. Also check that the pump is not burdened by the weight of the piping.
- if the pump is to stay in disuse for a long period of time, clean it carefully by running a non-flammable liquid detergent through it that is compatible with the pump's construction materials;
- if the pump was turned off for a long period of time, circulate clean water it in for some minutes to avoid incrustations
- before starting, after long periods of disuse, clean the internal and external surfaces with a damp cloth
- check the grounding;
- always protect the pump against possible collisions caused by moving objects or by various blunt materials that may damage it or react with its materials;
- protect the pump's surrounding ambient from splashes caused by accidental pump failure;

WARNING: the air supply pressure must never be over 7 bar or below 2 bar.

WARNING: when using the pump with aggressive or toxic liquids or with liquids that may represent a health hazard you must install suitable protection on the pump to contain, collect and signal any spills: DANGER OF POLLUTION, CONTAMINATION, INJURIES AND/OR DEATH.

WARNING: the pump must not be used with fluids that are not compatible with its construction materials or in a place containing incompatible fluids.

CAUTION: installing the pumps without on-off valves on the intake and delivery sides to intercept the product in case of spillage is forbidden: danger of uncontrolled product spillage.

CAUTION: installing the pumps without on-off, threeway or check valves on the air supply piping to prevent the pumped liquid from entering the pneumatic circuit if the diaphragms are broken is forbidden: danger of fluid entering the com-

pressed air circuit and being discharged into the environment.

WARNING: Should the user think that the temperature limits set forth in this manual may be exceeded during service, a protective device must be installed on the system to prevent the maximum allowed process temperature from being reached. If exceeded, respect of the maximum temperature marked cannot be guaranteed.

WARNING: The pumps must always be grounded irrespective of any organ to which they are connected. Lack of grounding or incorrect grounding will cancel the requirements for safety and protection against the risk of

WARNING: the use of pumps made with non-conductive material, which become charged with static, and without suitable grounding for flammable liquids is forbidden: RISK OF EXPLOSIONS DUE TO STATIC CHARGE.

CAUTION: Aggressive, toxic or dangerous liquids may cause serious injuries or damage to health, therefore it is forbiffen to return a pump containing such products to the manufacturer or to a service center. You must empty the internal circuits from the product first and wash and treat it.

CAUTION: Pumps containing aluminium parts or components coming into contact with the product cannot be used to pump III-trichloroethane, methylene chloride or solvents based on other halogenated hydrocarbons: DANGER OF AN EXPLOSION CAUSED BY A CHEMICAL REACTION.

CAUTION: The pumps ASTRA cannot pump Acetylene, Hydrogen, Carbon disulfide

CAUTION: The components of the pneumatic exchanger, including the shaft are made from materials that are not specifically resistant to chemical products. If the diaphragm should break, replace these elements completely if they have come into contact with the product.

CAUTION: The air-driven motor of the ASTRA pumps is self-lubricating and will not require any greasing. Therefore avoid using lubricated and non-dried air.

WARNING: ascertain that during service no anomalous noise appears. In that case, stop the pump immediately.

WARNING: ascertain that the fluid at the delivery side does not contain gas. Otherwise stop the pump immediately.

WARNING: the diaphragms (in contact with the product or the external ones) are highly subject to wear. Theirduration is strongly affected by the conditions of use and by chemical and physical stress. Fields tests carried out on thousands of pumps with a head value from 0° to 18° C have shown that normal service life exceeds one hundred million cycles. However, in places at risk of explosion, the diaphragm must be disassembled and checked every 5 million cycles and replaced every 20 million cycles.

WARNING:Periodic controls must be made to ensure that there is no powder and/or deposits on the external and internal surfaces of the pump and, if necessary, they must be cleaned with a damp cloth.

WARNING: removal of the silencer and the air supply fitting must be done when free from powder. Before restarting the pump, ensure that no powder has entered the pneumatic distributor.

To replace worn parts, use only original spare parts.

Failure to comply with the above may give rise to risks for the operator, the technicians, the persons, the pump and/or the environment that cannot be ascribed to the manufacturer.

However five general elements are important:

A- all the operations must be carried out by skilled personnel or monitored by qualified personal as appropriate
B- implement personal protection works (when the pump is installed in places involving more than occasional visits) against splashes of fluorescent fluid for accidental breakage and conveying works (always) of possible fluid leakages towards collection tanks
C- wear acid-resistant clothing and protection whenever operating on the pump
D- make sure that the Intake and delivery valves are correctly closed during the disassembly
E- make sure that there is no supply to the pneumatic circuit during the disassembly
It should be noted that it is very important to realize systems with pipes well arranged, identifiable, suitably equipped with shut-off valves, with comfortable compartments and passages for operators who must inspect their status (since the

pressure developed by the pump may promote failures to the system if it is of defective construction or worn).

OPERATORS FOR INSTALLATION AND START-UP

interventions to be carried out only by skilled personnel who may delegate to others some operations in accordance with
specific evaluations (required technical skills: plumbing, pneumatic and/or electric qualification as appropriate)

OPERATORS FOR USE AND MAINTENANCE

interventions to be carried out by generic operators (after being instructed on the correct use of the equipment):
- pump start-up/stop
- valves opening / closing with stopped pump
- casing emptying and washing by means of the prearranged valves and pipes
- filtering elements cleaning

interventions to be carried out by skilled personnel (required technical skills: general knowledge of the mechanical, electrical, chemical aspects of the equipment supplied by the pump and of the pump itself):
- environmental conditions check
- pumped fluid conditions check
- inspections of start-up/stop devices
- detection of malfunctions

OPERATORS FOR REPAIR
work to be carried out by generic operators supervised by skilled personnel:
- pump stop
- valves closing
- emptying of pump casing
- pipes disconnection from the connections
- unlocking of fastening screws to the base
- washing with water or suitable solvent as appropriate
- transport

Work to be carried out by skilled personnel (required technical skills: notions of mechanical processing, sensitivity with regard to damage to parts for impacts or abrasions during handling, familiar to tighten bolts on different plastic/metal materials, use of precision measuring instruments):
- casing opening and reclosing
- removal and replacement of damaged parts

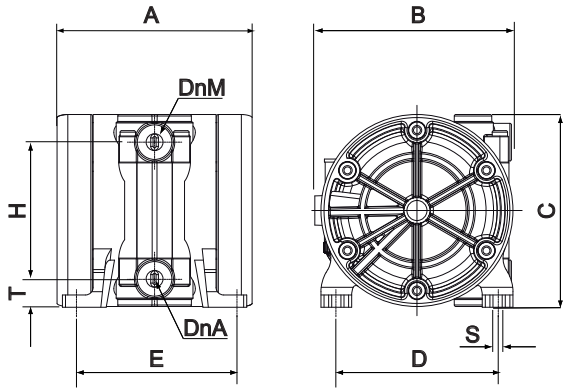
DISPOSAL

For type of material: separate plastic parts from metal parts and dispose of by authorized companies.

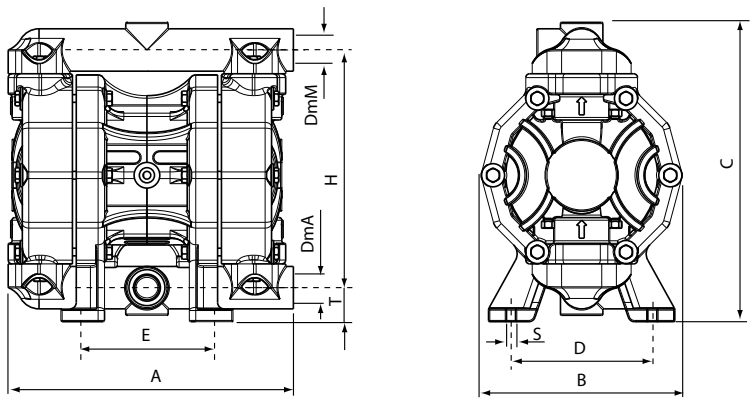
TROUBLESHOOTING AND POSSIBLE CAUSES

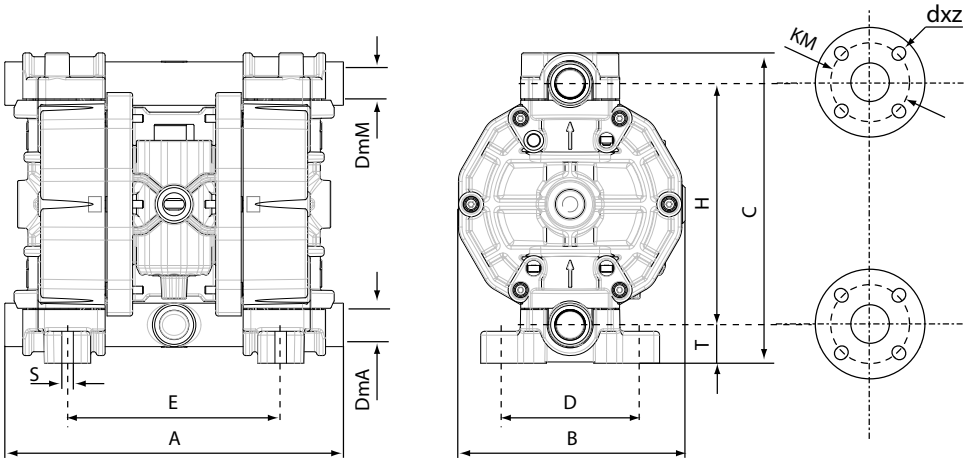
	DEFECT	CAUSE	SUGGESTION
1	The pump does not start	Circuit without air	Check the circuit (valves, connections, regulators, etc.)
		Insufficient air pressure	Adjust the air pressure
		Insufficient air flow rate	Check that the pipes and fittings have suitable passages
		Damaged control valve	Replace
		Damaged pneumatic distributor	Replace
		Pump delivery or intake closed	Open some valves, or remove the pipes and check if the pump starts
		Damaged discharge cover	Replace
		Broken diaphragm	Check if air comes out of the product delivery pipe, if yes replace the diaphragm.
2	The pump works butit does not pump.	The balls do not close.	Disassemble the manifolds and clean the seats or replace the balls and the seats.
		Excessive intake height.	Reduce the intake height.
		Too viscous fluid.	Install pipes with greater size especially for intake and decrease the pumps cycles.
		Clogged intake.	Check and clean.
3	The pump works with slow cycles	Excessively viscous fluid.	No remedy.
		Clogged delivery pipe.	Check and clean.
		Clogged intake.	Check and clean.
4	The pump works irregularly.	Internal pneumatic exchanger clogged or defective	Replace the pneumatic exchanger.
		Worn shaft.	Replace the pneumatic exchanger.
		Ice on the discharge.	Dehumidify and filter air.
		Air volume is lacking.	Check all the air control fittings, especially the quick couplings.
		Internal exchanger dirty	Replace.
5	The pump stalls	Intake clogs during operation.	Replace the intake pipe.
		Dirty air, full of condensate or oil.	Check the air line.
		Insufficient air volume or pressure.	Check the pressure with a gauge installed on thepump and with running pump. If pressurein that point is too low related to the mains pressure, check all the air connections, especially the quick couplings Check that all the air control devices have a sufficient flow rate. WARNING: In 90% of the cases stall conditions depends on the quick couplings.
		Defective distributor.	Replace it.
		The stop procedure was not respected.	Respect the stop procedure.
6	The pump does not deliver the flow rate indicated on the table.	The product intake pipe is not correctly connected.	Check.
		Clogged pipes.	Check and clean.
		Too viscous fluid.	Install pipes with greater size especially for intake and decrease the pumps cycles.
		The balls do not close.	Disassemble the manifolds and clean the seats or replace the balls and the seats.
		Insufficient air volume.	Check pressure with a gauge installed on the pump and with running pump. If pressure in that point is too low related to the mains pressure, check all the air connections, especially the quick couplings. Check that all the air control devices have a sufficient flow rate. WARNING: In 90% of the cases stall conditions depends on the quick couplings.

25R - 38R - 50R

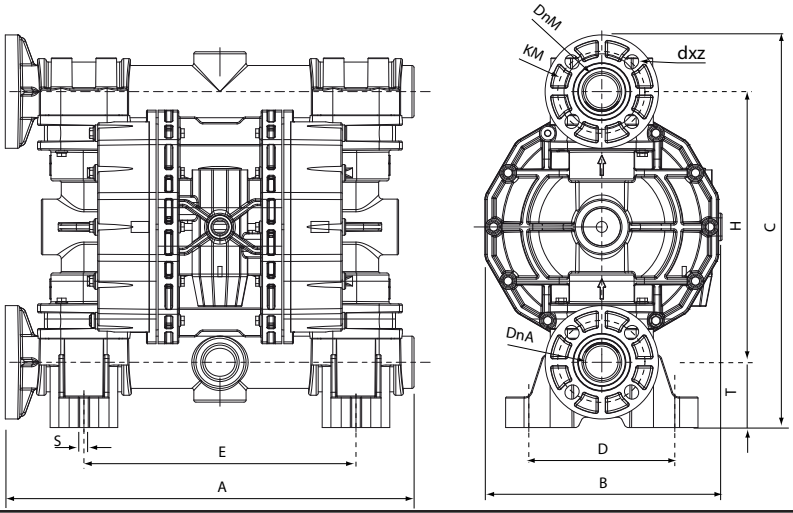


50C

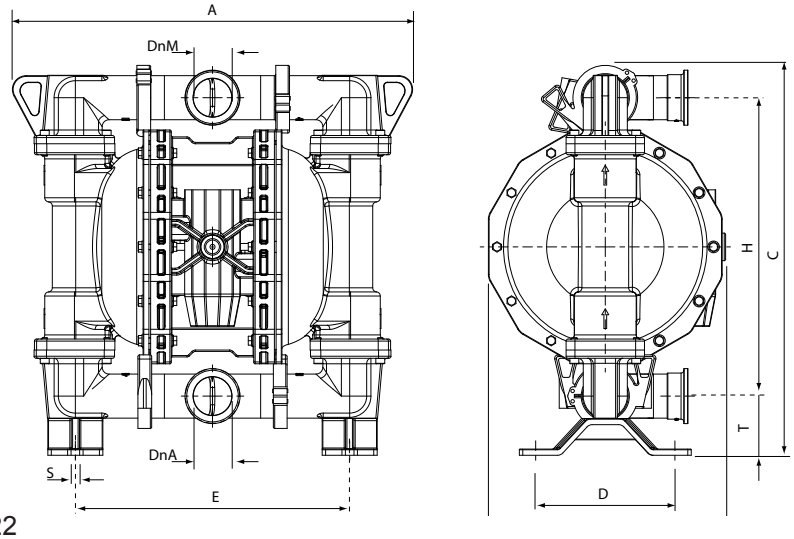




50 - 75 - 100C -100 - 125



150 - 200 (WR - FC - Al)



150 - 200 (SS - SP)

				THERMOPLASTIC PUMPS																							
Model				25R		38R		50R		50C		50		75		100c		100		125		150		200	
Version				WR	FC/DF	WR	FC/DF	WR	FC/DF	WR	FC/DF	WR	FC/DF	WR	FC/DF	WR	FC/DF	WR	FC/DF	WR	FC/DF	WR	FC/DF	WR	FC/DF
DmA			inch	1/4"		3/8"		1/2"		1/2"		1/2"		3/4"		3/4"		1"		1 1/4"		1 1/2"		2"	
DmM			inch	1/4"		3/8"		1/2"		1/2"		1/2"		3/4"		3/4"		1"		1 1/4"		1 1/2"		2"	
A			mm	155		155		155		222		265		265		291		370		370		595		595	
B			mm	135		135		135		156		177		177		175		222		222		340		340	
C			mm	125		125		125		233		246		246		245		365		365		565		572	
D			mm	99		99		99		110		110		110		110		155		155		212,5		212,5	
E			mm	112		112		112		110		167		167		175		231		231		396		396	
H			mm	93		93		93		185		189		189		189		292		292		394		394	
S			mm	6		6		6		7		9		9		9		9		9		12,5		12,5	
T			mm	16,5		16,5		16,5		26,5		30		30		30		39		39		95		95	
Inlet thread			inch	1/4"		3/8"		1/2"		1/2”		1/2"		3/4"		1"		1"		1 1/4"		1 1/2"		2"	
Outlet thread			inch	1/4"		3/8"		1/2"		1/2”		1/2"		3/4"		85(*)		1"		1 1/4"		1 1/2"		2"	
flanged connections	ISO	K	mm	nd		nd		nd		65(*)		65(*)		75(*)		14x4(*)		85(*)		100(*)		110		125	
		dxz	mm	nd		nd		nd		14x4(*)		14x4(*)		14x4(*)		79(*)		14x4(*)		18x4(*)		18x4		18x4	
	ANSI	K	mm	nd		nd		nd		60(*)		60(*)		70(*)		16x4(*)		79(*)		89(*)		98		121	
		dxz	mm	nd		nd		nd		16x4(*)		16x4(*)		16x4(*)		16x4(*)		16x4(*)		16x4(*)		16x4		19x4	
air connection			inch	1/4"		1/4"		1/4"		1/4”		1/2”		1/2”		1/2”		1/2"		1/2"		1/2"		1/2"	
Suction without liquid			m	5		6		6		5		6		6		6		6		6		6		6	
Min-Max air pressure			bar	2 - 7		2 - 7		2 - 7		2 - 7		2 - 7		2 - 7		2 - 7		2 - 7		2 - 7		2 - 7		2 - 7	
Max flow			l/min	10		20		32		50		65		100		100		160		250		500		680	
Weight			Kg	1	1,5	1	1,5	1	1,5	4	4,5	6,5	7	6,5	7	6,5	7	15	16	15	16	30	35	31	36
Noise			dB	76		76		76		77		78		78		78		80		80					

				METALLIC PUMPS																					
Model				50C			50		75			100		125			150			200					
Version				SS	AL	SP	SS	AL	SS	AL	SP	SS	AL	SS	AL	SP	SS	AL	SP	SS	AL	SP			
DmA			inch	1/2”			1/2"		3/4"			1"		1 1/4"			1 1/2"			2"					
DmM			inch	1/2”			1/2"		3/4"			1"		1 1/4"			1 1/2"			2"					
A			mm	225	225	232	251	265	247	265	247	359	370	359	370	359	582	595	582	582	595	582			
B			mm	156	156	156	177	177	177	177	177	222	222	222	222	222	345	345	345	345	345	345			
C			mm	230	230	233	249	246	249	246	249	348	370	348	370	348	567	568	567	567	572	567			
D			mm	110	110	110	89	110	89	110	89	129	155	129	155	129	202.5	212,5	202.5	202.5	212,5	202.5			
E			mm	110	110	110	176	167	176	167	176	254	231	254	231	254	399	396	399	399	396	399			
H			mm	183	183	181	185	189	185	189	185	272	292	272	292	272	434	394	434	434	394	434			
S			mm	7	7	7	9		9			9		9			12,5			12,5					
T			mm	26,5	25,5	26,5	40	30	40	30	40	46	39	46	39	46	86	95	86	86	95	86			
Inlet thread			inch	1/2”	1/2”	//	1/2"		3/4"		//	1"		1 1/4"		//	1 1/2"		//	2"		//			
Outlet thread			inch	1/2”	1/2”	//	1/2"		3/4"		//	1"		1 1/4"		//	1 1/2"		//	2"		//			
flanged connections	ISO	K	mm	65(*)		//	65(*)		75(*)		//	85(*)		100(*)		//	110		//	125		//			
		dxz	mm	14x4(*)		//	14x4(*)		14x4(*)		//	14x4(*)		18x4(*)		//	18x4		//	18x4		//			
	ANSI	K	mm	60(*)		//	60(*)		70(*)		//	79(*)		89(*)		//	98		//	121		//			
		dxz	mm	16x4(*)		//	16x4(*)		16x4(*)		//	16x4(*)		16x4(*)		//	16x4		//	19x4		//			
Clamp			inch		nd	1”	nd		nd		1”	nd		nd		1 1/2”	nd		2”	nd		2 1/2”			
air connection			inch	1/4”			1/2”		1/2”			1/2"		1/2"			1/2"			1/2"					
Suction without liquid			m	5			6		6			6		6			6			6					
Min-Max air pressure			bar	2 - 7			2 - 7		2 - 7			2 - 7		2 - 7			2 - 7			2 - 7					
Max flow			l/min	50			65		100			160		250			500			680					
Weight			Kg	6	5	6	9	7	9	7	9	20	16	20	16	20	58	35	58	60	36	60			
Noise			dB	77			78		78			80		80											

MANUFACTURER DATA

Production head and legal office:
Via Labirinto, 159 I - 25125 BRESCIA
Tel: 030 3507011 Fax: 030 3507077

Administration:	Tel: 030 3507019
Export manager:	Tel: 030 3507022
Customer service:	Tel: 030 3507025
Web:	www.argal.it
E-mail:	sales@argal.it

CONTRACTUAL DATA	
medium _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	
conc. % _ _ _ _ _ _ _	temperature °C _ _ _ _ _ _ _
capacity m^3/h _ _ _ _ _ _	head m _ _ _ _ _ _ _

w.o.
_ _ _ _ _ _ _ _ _

REV.9 - 04/12

The INSTRUCTION MANUAL must be delivered to the pump-user , who takes diligent note of it, fills in data for Maintenance Department (page 1), keeps the file for subsequent reference.Possible modifications do not imply updating of the existing manuals

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